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ABSTRACT

The properties of three critical elements in the human diet are discussed. In the first section, the functions of sodium in the body and in the diet are considered. The relationship between sodium and hypertension is explored, and recommendations from professional health groups on the sodium consumption are presented. In the second section, the consumption of fat and cholesterol is discussed. The body's use of dietary fat is discussed, and the distinction is clarified among saturated, monounsaturated, and polyunsaturated fatty acids. An overview is given of the connection between consumption of fats and cholesterol and coronary heart disease. Data relating fat and cholesterol to cancer are reviewed, and recommendations from professional health groups are presented. In the last section, the consumption of refined sugar and caloric sweeteners is discussed within the framework of the body's need for carbohydrates. The relationshp of sugar and dental caries, hyperactivity, and hyperkinesis is discussed. References and fact sheets are included for each of these nutrients. (JD)

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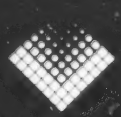
Contemporary Topics in Nutrition

SODIUM

CHOLESTEROL FAT



REFINED SUGAR CALORIC SWEETENERS

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SP 025 281

SODIUM

"Should all healthy people in the United States reduce their sodium intake to avoid developing hypertension?"

Sodium in the body

Sodium is an essential nutrient. It functions in the body to maintain blood volume, to regulate the balance of water in the body's cells, and to transmit nerve impulses.

Sodium balance is maintained primarily by the kidneys, by increasing or decreasing sodium in the urine. While the kidneys can maintain sodium balance on as little as 200 mg sodium/day, the average healthy individual may require much more, possibly 3-4 g, to maintain normal daily physical activity.[1]

Sodium in the diet

Americans consume, on the average, approximately 3600-5850 mg of sodium per day (9-15 g of salt).[2,3] Sodium occurs naturally in many foods and commonly is added to food during processing, home preparation, and consumption. In addition, sodium is found in drinking water and many prescription drugs and over-the-counter medications.

Salt and other ingredients containing sodium commonly added during home cooking or at the table contribute 1300-2500 mg of sodium to the diet per day.[4] One teaspoon of table salt contains approximately 2000 mg of sodium.

Other popular condiments, such as onion salt (1620 mg of Na per teaspoon), garlic salt (1850 mg Na per tsp.), monosodium glutamate (MSG) (492 mg Na per tsp.), soy sauce (343 mg Na per tsp.), and meat tenderizer (1750 mg Na per tsp.), also may contribute to the discretionary use of sodium and, thus, to total sodium intake.[5]

Today most of our food supply is processed, at least to some extent. Sodium is commonly added to foods during processing. A 1978 government survey found that approximately 90 percent of all foods on the supermarket shelf carried ingredient lists. Of these, 76 percent had at least one sodium-containing ingredient.[6]

Salt and other sodium-containing compounds are used widely in food processing because they have many desirable qualities, including:

- Preserving perishable foods
- Flavoring foods
- Retarding growth of mold/bacteria by reducing water content
- Curing meats (e.g., hot dogs/sausages)
- Fermenting foods (e.g., turning cabbage to sauerkraut)
- Controlling texture of foods (e.g., cheese)
- Controlling rate of fermentation of yeast and strengthening gluten in bread.

Data obtained from the National Health and Nutrition Examination Survey, 1976-1980, reveal that average daily consumption of sodium found naturally in food and added during processing is 3340 mg for males and 2300 mg for females.[7]

Of this sodium, the Milk Group contributed 12.8 percent, the Meat Group 19.1 percent, the Fruit-Vegetable Group 10.6 percent, the Grain Group 24.1 percent, and the "Others" category 14.8 percent. A final category of combination foods (including soups, gravies and mixed protein dishes) contributed a total of 20.0 percent.[8*]

*These values represent a weighted mean of the raw data which were presented as means for various age-groups. They were calculated by multiplying the mean contribution of a food group by the number of individuals used to determine that mean, summing those products across age-groups, and dividing that sum by the total number of individuals used in the survey.

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Hypertension

Hypertension is a condition with a complex etiology that is not completely understood. Scientists cannot say, in most instances, precisely what causes hypertension. However, they have identified several factors which are associated with the development of high blood pressure. These factors include: genetic predisposition, cigarette smoking, obesity, inadequate dietary calcium and potassium, excessive dietary sodium, lack of exercise, and emotional stress.

Hypertension is a serious condition. It can lead to stroke, heart attack, and kidney disease.

Sodium and hypertension

A direct relationship has been observed between dietary sodium intake and hypertension in some individuals. However, the precise nature of this relationship has not been clearly defined.

Evidence of the association between dietary sodium intake and hypertension has been accumulated from epidemiological studies and from animal and human clinical trials.[9, 10, 11, 12, 13, 14, 15]

Recently, conclusions from epidemiological studies suggesting an association between sodium and hypertension have been questioned on the following bases:

- Some studies fail to show such an association
- Studies have documented populations with a relatively high sodium intake but without hypertension
- Studies have documented populations with restricted sodium intake but with hypertension
- Studies showing an association between sodium and hypertension have not taken into consideration other factors such as body weight and the intake of other nutrients such as calcium, essential fatty acids, and potassium.[16]

Conclusions extrapolated from animal studies to humans also must be viewed cautiously. The amount of sodium fed to induce high blood pressure in these studies often is many times the amount that humans ingest. Some of these studies also have required administration of certain hormones along with sodium, a condition to which humans are never exposed.[17]

The relationship between dietary sodium and hypertension is highly variable among individuals. While a decrease in dietary sodium intake may benefit some hypertensive individuals, other interrelated factors (e.g., heredity, cigarette smoking, obesity) may be equally significant in treating or preventing hypertension. It is not clearly established that a reduction in dietary sodium by healthy individuals will reduce the incidence of this disease.[18]

Recommendations of professional groups

The Food and Nutrition Board of the National Academy of Sciences recommends 1100-3300 mg of sodium per day as a safe and adequate range for adults.[19] The American Medical Association suggests 4800 mg of sodium per day as a tentative definition of moderation in sodium intake.[20] The American Heart Association does not recommend a specific level of sodium intake but does suggest a general recommendation to reduce dietary sodium. They support this recommendation by stating, "A reduction in dietary sodium might accomplish either or both of two aims: (1) prevention of hypertension in susceptible individuals or (2) reduction in the average level of blood pressure in the general population. Obviously, the relatively high consumption of salt by the U.S. public does not cause hypertension in the majority of people, and it can be asked whether a universal and marked change in sodium intake is needed for the prevention of overt hypertension in the 10-15 percent of the population who are salt-sensitive."[21]

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CHOLESTEROL/FAT

"Should all healthy people in the United States reduce their consumption of fat and cholesterol to avoid developing coronary heart disease and/or cancer?"

The body's need for cholesterol

Cholesterol was first identified around 1775 as a component of gallstones. The word cholesterol comes from *chole* meaning bile and *steros* meaning solid.

Since that time, cholesterol has been shown to be essential for human life. It is an important component of cell membranes, plays a key role in brain and nerve function, and acts as a precursor of bile acids, steroid hormones, and vitamin D. Cholesterol, in combination with calcium, may also be involved in the tissue repair process.

Cholesterol is not an essential component in the diet of adults since it is synthesized in the body, primarily in the liver and intestine, at a rate sufficient to meet body needs. The rate of synthesis varies between 0.5 and 1.0 g per day depending on many factors, including the intake of dietary cholesterol, bile salts, and total energy. In most individuals, sensitive feedback mechanisms operate to regulate synthesis of cholesterol so that body stores remain relatively constant.[1]

Types of lipoproteins

Cholesterol is carried in the blood by lipoproteins—fat and protein complexes. Lipoproteins can be classified in different ways. Using the most popular criterion—density—there are four types: chylomicrons, very low density lipoproteins (VLDL), low density lipoproteins (LDL), and high density lipoproteins (HDL). The following chart shows the approximate percentage of each type of lipoprotein which is cholesterol.[2]

	Cholesterol %
Chylomicrons	6
VLDL	20
LDL	46
HDL	20

Less than 10 percent of the total body cholesterol is found in the blood. Of the cholesterol found in plasma, normally 65 percent is carried by LDL, 20 percent by HDL, and 15 percent by VLDL.[3]

It is currently thought that LDL carries cholesterol to the cells and HDL picks up cholesterol from the cells to be returned to the liver for re-excretion into the plasma or conversion to bile acids.[4]

Cholesterol leaves the body primarily by conversion to bile acids in the liver, but also by conversion to steroid hormones and excretion through feces and the skin surface.

Dietary cholesterol

Dietary cholesterol is found only in foods of animal origin. Mean daily cholesterol intake is 405 mg for males and 266 mg for females.[5] Foods from the Milk Group contribute 16.2 percent of the dietary cholesterol; the Meat Group 64.6 percent; the Fruit-Vegetable Group 0.7 percent;* the Grain Group 2.9 percent;* the "Others" category 7.9 percent. Foods that are considered combination foods (including soups, gravies, and mixed protein dishes) contribute 6.7 percent.[6]**

It is estimated that an average of 50 percent of dietary cholesterol is absorbed. However, the actual amount of cholesterol absorbed from a food item varies among individuals and even from day to day for the same individual. The absorption of cholesterol may be affected by several factors including the kind and amount of dietary fat, the presence of plant sterols in the diet, and the total intake of dietary cholesterol.[7]

*Foods in this group receive cholesterol from foods of animal origin added in processing, cooking, and/or serving.

**These values represent a weighted mean of the raw data which were presented as means for various age-groups. They were calculated by multiplying the mean contribution of a food group by the number of individuals used to determine that mean, summing those products across age-groups, and dividing that sum by the total number of individuals used in the survey.

The body's use of dietary fat

Dietary fat serves the body as a concentrated source of energy and as a carrier for fat-soluble vitamins A, D, E, and K and provides essential fatty acids. These needs can be met by daily consumption of 15-25 g of appropriate food fats.[8]

Calories from dietary fat, carbohydrate, and protein above those needed for activity and metabolism are stored primarily as fat in adipose cells. These cells make up the adipose tissue which provides thermal insulation for the body and protects it and its organs from mechanical stress by cushioning them.

Dietary fat

The mean daily intake of fat in the United States is 98 g for males (37 percent of calories) and 64 g for females (37 percent of calories).[9] Food groups supply the following percentages of fat in the average diet:

Milk Group	19.2%
Meat Group	31.5%
Fruit-Vegetable Group	5.4%
Grain Group	7.8%
"Others" category	30.5%

Combination foods supply 7.6 percent of the dietary fat.[10]***

***These values represent a weighted mean of the raw data which were presented as means for various age-groups. They were calculated by multiplying the mean contribution of a food group by the number of individuals used to determine that mean, summing those products across age-groups, and dividing that sum by the total number of individuals used in the survey.

Saturated, monounsaturated, and polyunsaturated fatty acids

In discussing dietary fat and its relationship to degenerative diseases, an important distinction is made among saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA). Although most fats contain all three types of fatty acids in varying proportions, a fat is commonly classified according to the fatty acid that predominates in its composition.

Saturated fats:

- Contain a predominance of saturated fatty acids
- Are usually solid at room temperature
- Include most animal fats, coconut oil, palm oil
- Are thought to increase the level of serum cholesterol relative to fats containing predominantly PUFA or MUFA.[11]

Monounsaturated fats:

- Contain a predominance of monounsaturated fatty acids
- Include olive oil, peanut oil
- Are thought to have a neutral effect on blood cholesterol relative to fats containing predominantly SFA and PUFA.[12]

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Polyunsaturated fats:

- Contain a predominance of polyunsaturated fatty acids
- Are usually liquid at room temperature
- Include corn oil, safflower oil, soybean oil
- Are thought to decrease serum cholesterol level relative to fats containing predominantly SFA and MUFA.[13]

On the average, the U.S. population consumes about three times more saturated fatty acids than polyunsaturated fatty acids. The following chart gives a breakdown for males and females in the U.S. population.[14]

Percentage of total energy consumed

	as saturated fats	as polyunsaturated fats
Males	13.6	5.0
Females	13.0	5.3

Coronary heart disease—overview

Although coronary heart disease (CHD) in the U.S. has been on the decline since the mid [illegible]'s, it is still the number one cause of death in our country.[15]

There are several types of coronary heart disease. The one most commonly spoken of is arteriosclerosis, or hardening of the arteries, which causes the arterial walls to thicken and lose elasticity. Atherosclerosis, a form of arteriosclerosis, occurs when deposits of fatty substances and other materials (plaque) become attached to the inner wall of an artery. As the deposits build up, the inner wall of the artery narrows which reduces the capacity for blood flow. This process occurs over a long period of time. In some individuals it may begin as early as adolescence. However, often it is not until a coronary artery becomes severely occluded or totally blocked that an individual realizes the gravity of the problem.

After years of study, researchers realize that CHD has a very complex etiology. At this point they are unable to identify all the causes of the various forms of CHD. However, they are able to identify some of the risk factors associated with CHD (i.e., the statistical associations based on population data which allow one to estimate the likelihood for developing the disease). The major risk factors for CHD are high blood cholesterol, hypertension, and cigarette smoking.

Other risk factors for CHD include emotional stress, a sedentary lifestyle, overweight, diabetes, heart abnormalities, a family history of heart disease, age, sex, and race. Assessment of these risk factors presently accounts for only about 50 percent of the variance associated with the development of CHD.[16]

While extensive epidemiological studies have found positive correlations between high serum cholesterol levels and incidence of CHD, more recent findings indicate that total plasma cholesterol is only weakly related to CHD risk compared to correlations between LDL cholesterol and HDL cholesterol and CHD.[17]

LDL cholesterol is positively correlated with risk of CHD and HDL is inversely correlated (i.e., HDL cholesterol appears to be a protective factor). In men, the ratio of HDL to total cholesterol can predict risk more accurately than any other lipid factor or combination of factors.[18] Thus, measuring total serum cholesterol, without distinguishing these different components, may not give an accurate assessment of risk.

CHD—the diet connection

In spite of the growing knowledge in this area, several unanswered questions still exist. First, how important and for whom is diet modification effective in controlling blood cholesterol levels? Second, how effective is reduction of blood cholesterol levels in reducing the probability of cardiovascular disease?

All the studies cited below used dietary modification in humans to try to reduce serum cholesterol. These diets included both an increase in polyunsaturated fats and a decrease in saturated fats.

In one study the kinds and amounts of dietary fat and dietary cholesterol were altered for patients under rigid dietary

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control. This experiment resulted in reduction in serum lipid and lipoprotein concentration.[19] However, similar dietary changes in a free-living population were much less effective in altering serum lipid concentrations. Clearly, other factors in addition to diet influence serum lipid levels in a free-living population.[20]

Results of several other intervention trials in which diet modification has been employed to alter the incidence of coronary artery disease have been equivocal. In seven large-scale studies involving over 3000 men, serum cholesterol concentrations were decreased by 7-16 percent and there were marginal decreases in CHD. However, no differences were found in overall mortality.[21] Thus, although high serum cholesterol and LDL levels are positive risk factors for CHD and diet alterations may affect these levels, there is no proof that such alterations will consistently affect total mortality.

In a recent trial in Oslo, investigators studied the effect of diet and smoking intervention on the incidence of CHD over a five year period. The subjects of the study were men between the ages of 40 and 49, predominantly smokers (80 percent), who had mean blood cholesterol levels of 328mg/100ml. (This value corresponds to about the 95th percentile and above of similarly aged men in the United States.[22]) Men in the intervention group were advised to alter their diets to lower blood lipids and to stop smoking. At the end of the observation period, the incidence of heart attack (fatal and non-fatal) and sudden death was significantly lower in the intervention group. However, the authors stated that had this been a diet trial only, the difference in incidence of heart attack probably would not have reached significance.[23] While this study lends support to the advisability of intervention in a high-risk group of men, it does not prove the value of dietary changes alone nor does it lend support for dietary changes for the general healthy population.[24]

Two other factors also must be considered before making recommendations for widespread dietary changes. First, all individuals do not react similarly to a specific dietary modification. A diet that reduces cholesterol in one person may have no effect on another person. It appears only "responders" receive any potential benefit from dietary changes. Unfortunately, an easy way to identify "responders" has not been developed, although work in this area is underway.[25]

The second reason for caution in making general recommendations to the public concerns possible consequences of an increased intake of polyunsaturated fats. There is some indication that, in addition to lowering LDL, polyunsaturated fats also lower HDL.[26] Since HDL has been shown to be protective against CHD, the risk of lowering HDL may outweigh the benefits of lowering LDL and/or total cholesterol.

Cancer and diet

Data relating fat and cholesterol to cancer have come from both epidemiological and animal studies. Such studies have examined the relationship between high fat diets and cancer, high cholesterol diets and cancer, and low blood cholesterol levels and cancer.

Epidemiological data have revealed positive correlations between total amount of fat available for consumption and incidence of certain cancers. However, a consistent relationship has not always been found. For example, within a given population there are both positive correlations between deaths by breast, intestine, and prostate cancers and the per capita fat consumption, as well as negative correlations between deaths by esophagus, stomach, and liver cancers and the very same per capita fat consumption. Furthermore, countries having the same death rate for a particular cancer may vary by 100 percent in the average total fat intake of their respective populations.[27]

Several animal studies have shown that high fat diets stimulate tumor growth to a greater extent than low fat diets.[28] It has been hypothesized that this happens in the following way: High dietary fat increases bile secretion which increases bile acids and neutral steroids in the large bowel. This increase in bile acids and neutral steroids may change the composition and metabolic activity of the intestinal microflora. The change in microflora

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may lead to bile acids and neutral sterols being converted to carcinogens or cocarcinogenic compounds.[29] However, since a specific carcinogen for human colon cancer has not been identified, this hypothesis needs further study.

Polyunsaturated fats appear to stimulate the development of tumors more than saturated fats.[30] As with heart disease, the kind and amount of fat or the ratio of polyunsaturated to saturated fats at which these effects become evident has not been clearly defined.

Other dietary factors may modify the risk of developing cancer. For example, fiber, which decreases transit time through the gut and, thus, decreases time of exposure of the gut to potential carcinogenic compounds, may decrease the risk of developing colon cancer.[31]

Investigations have looked at cholesterol to see what role it may play in colon cancer. Researchers have studied the conversion of cholesterol to bile acids and the subsequent microbial conversion to carcinogenic or cocarcinogenic compounds.[32] A clear relationship, however, has not been established between dietary cholesterol and colon cancer. Furthermore, differences in metabolism between experimental animals and humans suggest caution in extrapolating the results of animal studies to humans.

Most recently, evidence for an association between low serum cholesterol concentrations and increased risk of colon cancer in men has been reported.[33, 34] Results of several studies designed to investigate the effect of a cholesterol-lowering diet on modifying the risk of CHD have shown an increased incidence of cancer in men consuming the cholesterol-lowering diet and in those with low blood cholesterol levels (i.e., less than 190mg/100ml). A causal relationship has not been established and the data are far from consistent.[35] However, these new data reinforce doubts about recommending cholesterol reduction by dietary means to the general healthy population.

In conclusion, many of the studies relating diet to CHD or cancer have been useful in generating hypotheses. However, confirmation of these hypotheses has yet to be established. Clearly, more studies are needed.

Recommendations of professional groups

Rather than making a blanket recommendation for dietary change for the entire population, the Committee on Dietary Allowances, Food and Nutrition Board, National Research Council suggests as a guideline that total fat intake, especially in diets below 2000 kcal, contribute not more than 35 percent of dietary energy. The Committee further suggests a limit of 10 percent of dietary energy from polyunsaturated fats. A recommendation concerning dietary cholesterol is not made.[36]

The American Heart Association recommends that fat contribute 30-35 percent of total energy, saturated fatty acids contribute less than 10 percent of total energy, and cholesterol less than 300 mg/day.[37]

The United States Department of Agriculture and Department of Health and Human Services suggest a general guideline of avoiding too much fat, saturated fatty acids, and cholesterol, without specifically defining "too much."[38]

The National Academy of Sciences (NAS) has a somewhat different perspective on the issue. In its "Outlook for Science and Technology: the Next Five Years" they report:

The "bulk of...recent evidence neither supports nor denies the diet-heart hypothesis...It would appear that the admonition that to avoid coronary artery disease people who do not show overt signs of atherosclerosis, who do not exhibit an elevated blood level of cholesterol, and who exhibit none of the other risk factors, except perhaps age and male sex, should eat diets significantly restricted in cholesterol and high in polyunsaturated fatty acids rests on somewhat shaky foundations."

Also, the NAS is uncertain whether diets high in polyunsaturated fats and low in cholesterol are actually harmless. Animal studies where monkeys were fed diets high in peanut or coconut oil were found to increase production of intima cells in the arteries with subsequent scarring.

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Butterfat in similar amounts produced harmless fatty streaks.

Also, according to NAS, the highest overall mortality rates (particularly from cancer) are found in the population segment with the lowest serum cholesterol rating. The very diet recommended to protect an individual from heart disease may have equally serious consequences.

The NAS cautions that the public may have unrealistic expectations about what role diet modification can or cannot play in controlling disease. They point out that, before these scientific theories become public policy, we must make sure they have been subject to critical scientific evaluation.[39]

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REFINED SUGAR/CALORIC SWEETENERS

"Is the consumption of refined sugars and other caloric sweeteners responsible for the development of dental caries and the hyperkinetic syndrome?"

Definition

For the purpose of this commentary, the term refined sugar and other caloric sweeteners will refer to refined cane and beet sugar, syrups, corn sugar (dextrose), molasses, honey, sorghum, and maple products. It is this group of carbohydrates that frequently is implicated in the development of dental caries and that recently has been suggested as a possible cause of the hyperkinetic syndrome in children.

The body's need for carbohydrate

There are two principal types of carbohydrates: simple carbohydrates (sugars) and complex carbohydrates (starches). For most individuals, carbohydrates are the major source of glucose which the body needs for energy. Since the body can synthesize glucose from other dietary components (protein or fat), there is no specific requirement for carbohydrate in the diet. However, when there is no carbohydrate in the diet and the body uses protein or fat for energy, there are physiological consequences. These consequences may include ketosis, excessive breakdown of muscle, loss of cations (especially sodium), and involuntary dehydration. Although 50-100 g of carbohydrate per day is not enough to meet energy needs, it is adequate to prevent the adverse consequences listed above.

The body has no specific requirement for refined sugars. However, for individuals with high energy needs (e.g., athletes or those who do heavy manual labor), refined sugars offer a readily available source of energy.

Trends in carbohydrate availability

Even though the total per capita amount of carbohydrate available for consumption has decreased by about 20 percent since the turn of the century, the amount of sugar available for consumption has increased by 36 percent between 1909 and 1979.[1]

While there have been modest increases (12-15 percent) in consumption of naturally occurring sugars and refined sugars, there has been almost a 400 percent jump in use of syrups, corn sugars, and other sweeteners since the turn of the century.[2]

Today's consumers have less direct control over the amount of sugar in their diets than the consumers of 1909. The major use of sugar has shifted from direct use by consumers in the household to use by industry in commercial preparation of food and beverages. In 1978 about 70 percent of the refined sugar (beet/cane) for civilian consumption was used by industry in commercially prepared foods and beverages. Increased use of sweeteners (i.e., honey, corn syrup, etc.) by the food and beverage industry puts even greater control of total sugar availability in their hands.[3]

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(continued)

Daily Per Capita Carbohydrate Available for Consumption in the United States[4]

	1909-13	1925-29	1969	1979
Total Carbohydrate, g	492			400
Total Sugar, g	157	198	198	213
Naturally Occurring, g	51	56	59	58
Refined, Beet/Cane, g	92	123	117	107
*Other, g	13	20	22	48
Total Sugar, % Cal.	18.0	22.9	24.2	24.4
Naturally Occurring, % Cal.	5.9	6.4	7.2	6.7
Refined, Beet/Cane, % Cal.	10.6	14.2	14.2	12.2
*Other, % Cal.	1.5	2.3	2.7	5.5

*Includes syrups, corn sugar (dextrose), honey, molasses, sorghum and maple products.

The sugar confusion

Dietary recommendations by some groups have suggested that all Americans should decrease consumption of simple carbohydrates while increasing consumption of complex carbohydrates.[5,6] Reasons for advocating this position vary. However, the common denominator of these recommendations is that they will somehow contribute to better overall health and well-being.

Implicit in these recommendations are the assumptions that:

- The body can distinguish between a glucose molecule obtained from starch and one obtained from refined sugars and other caloric sweeteners.
- The body can distinguish between a sucrose molecule obtained from fruit and one obtained from refined sugar and other caloric sweeteners.
- Refined sugars and other caloric sweeteners lack components found in complex carbohydrates or "naturally occurring" sugars which make the latter beneficial.
- Refined sugars and other caloric sweeteners contain substances which are harmful when consumed in relatively large amounts.

There is no evidence to support any of these assumptions.[7]

From a nutritional viewpoint, refined sugars and other caloric sweeteners in the diet can become a problem for the healthy individual in several instances:

- when they provide more energy than the body needs to maintain energy balance
- when their consumption results in the exclusion of more nutrient-dense foods to the point of an inadequate intake of one or more nutrients (Both concepts are, of course, true for any foodstuff, be it sugar, protein, fat, or complex carbohydrate.)
- when they are consumed in such quantity, form, or frequency or at such times to encourage the development of dental caries.

Sugar and dental caries

The relationship between sugar consumption and dental caries is based on epidemiological surveys, animal experiments, and controlled human studies.[8] The development of caries is due to the destruction of the tooth surface by acids. These acids are produced by the microbial population found in the plaque surrounding the teeth. Although acid production occurs whenever carbohydrates are present in the mouth, it is more readily produced from sucrose and other simple sugars than from more complex carbohydrates.[9]

One very important factor which influences the development of dental caries is the amount of time that teeth are exposed to an acid environment. Two factors influence the length of exposure: the frequency of sugar consumption and the form in which sugar is consumed. The more frequently sugar is consumed, the longer the tooth will be exposed to an acid environment, and the greater the likelihood that caries will develop. Sugar-containing foods which are sticky, or which are cleared from the teeth slowly, have greater acidogenic properties because the teeth are likewise exposed to the acid environment for a longer period of time. They are, therefore, potentially more cariogenic than non-sticky sugared food.[10]

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(continued)

What is not always appreciated is that other factors also affect the potential for the development of caries. These factors include whether the sugar is consumed in a meal or as a snack, proper oral hygiene, and fluoride administration.[11, 12]

When sugar or highly sugared foods are eaten with a meal, as opposed to between meals, the other foods consumed can have a buffering effect on acid production. This buffering effect decreases the acidogenic potential of sugar and, likewise, the potential for caries development. Recently, aged cheddar cheese, as well as some other cheeses, have been shown to stop the acid production normally found after a sucrose meal.[13]

Hyperactivity, hyperkinesis, and the hyperkinetic syndrome

Although these terms are often used interchangeably, there are subtle differences in their meanings. The casual use of these terms has often resulted in misdiagnosis of a medical condition or mislabeling of a very active child as pathologically active. For the purposes of this discussion, the following definitions will be used:

Hyperkinetic syndrome: an attention-deficit disorder with hyperactivity... (whereby) the child displays, for his or her mental and chronological age, signs of developmentally inappropriate inattention, impulsiveness, and hyperactivity.[14]

Hyperactive: excessively or pathologically active.[15]

Hyperkinesis: abnormally increased and usually purposeless and uncontrollable muscular movement.[16]

In spite of a deluge of reports concerning the hyperkinetic syndrome (in both lay and professional writing), the cause of this disorder is unclear. The syndrome was first reported in 1902. Yet researchers still do not know if it is caused by physiological, psychological, or environmental factors or some combination of these.

We do know that more males than females (9:1) exhibit the symptoms of the hyperkinetic syndrome. Although estimates of its incidence among U.S. children range from 5-20 percent, it is actually quite rare.[17] Its seemingly high incidence is a result of the casual use and misuse of the terms used to describe often similar but medically different behavioral disorders.

Hyperactivity is one component of the hyperkinetic syndrome. According to the Council on Child Health of the American Academy of Pediatrics (1975), many physicians do not appreciate the difficulty in diagnosing hyperactivity.[18] One of the reasons for this difficulty is because hyperactivity may or may not be pathological in nature and its symptoms are representative of behaviors of many normal children. According to the American Psychiatric Association, a hyperactive child will display at least two of the following behaviors:

- running about or climbing on things excessively
- having difficulty sitting still or fidgeting excessively
- having difficulty staying seated
- moving around excessively during sleep
- being always on the go or acting as if driven by a motor.[19]

Obviously running, climbing, and fidgeting are behaviors common to all children at one time or another. The difference between the behavior of a pathologically hyperactive child and that of a normal child who is very active is more in degree and cause than in type of behavior.

Sugar and hyperkinesis, hyperactivity, and the hyperkinetic syndrome

A relationship between refined sugar and other caloric sweeteners and children's behavior has not been established. Reports that these substances influence behavior are based on anecdotal observations (often by parents and teachers) and inadequately controlled experiments.[20]

Until more is learned about the actual causes of hyperactivity, hyperkinesis and the hyperkinetic syndrome and until reliable and valid studies can be designed to measure the effectiveness of various treatments, there is no scientific evidence to support the theory that refined sugar causes any of these behavioral disorders. Therefore, any recommendation to eliminate sugar from the diets of children in order to treat (or prevent) behavioral disorders is unfounded.

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Master Copies for Consumer Handouts

This set of masters can be used by health professionals to reproduce consumer education handout materials on Sodium, Cholesterol/Fat and Refined Sugar/Caloric Sweeteners. Copies can be made from the masters using an electric stencil maker, photostat copier, or master transparency maker.

These consumer materials highlight some of the basic information presented in Contemporary Topics in Nutrition. They are designed to increase consumer understanding of how these topics relate to personal lifestyle.

Each handout can be used singly or in combination with any of the others on the same topic to address consumers' particular needs and interests. The materials provide an effective basis for individual study as well as for small group discussion and counseling.

Content:

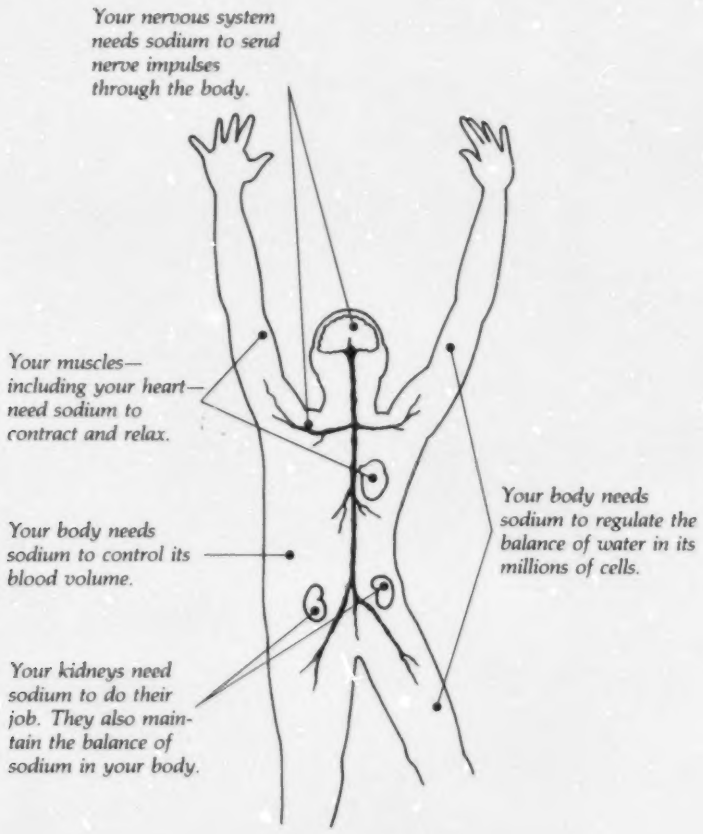
Topic	Handout Title
Sodium	Sodium Facts
	Sodium Wheel (sodium content of common foods)
	Your Sodium Lifestyle
	Worried About High Blood Pressure?
Cholesterol/Fat	Cholesterol Facts
	Cholesterol Wheel (Cholesterol content of common foods)
	Fat Facts
	Fat Wheel (Fat content of common foods)
	Are You at Risk for Heart Disease?
Refined Sugar/Caloric Sweeteners	Sugar Facts

Sodium Facts

What is sodium?

- Sodium is an essential nutrient.
- It is one of the minerals your body must have in order to function normally.

Your body needs sodium.


Your nervous system needs sodium to send nerve impulses through the body.
Your muscles—including your heart—need sodium to contract and relax.
Your body needs sodium to control its blood volume.
Your kidneys need sodium to do their job. They also maintain the balance of sodium in your body.
Your body needs sodium to regulate the balance of water in its millions of cells.

How much sodium do you need?

The Food and Nutrition Board of the National Academy of Sciences recommends from 1100 to 3300 mg (milligrams) of sodium daily for adults. About ½ to 1½ teaspoons of salt contain this much sodium.

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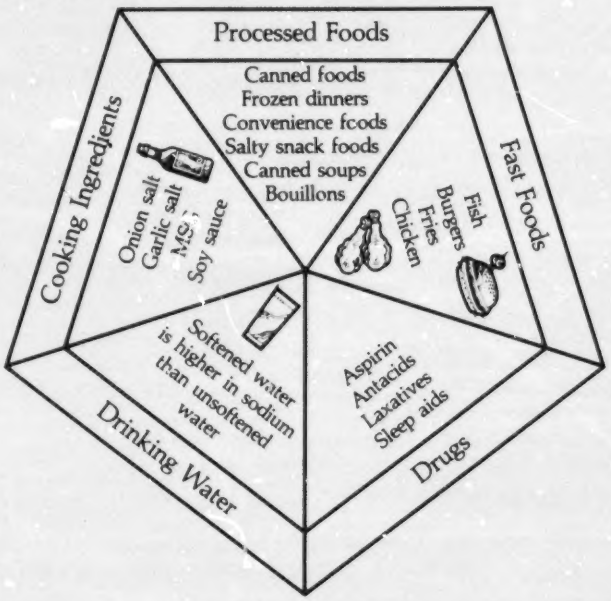
Where do you get sodium?

You get sodium from the foods you eat. Almost all foods contain small amounts of sodium naturally. However, you also get sodium from other sources. *The biggest single source of sodium in your diet is sodium chloride—better known as table salt.* Other sources of sodium include:



Is there a problem if you eat too little or too much sodium?

Because sodium is readily available in the American food supply, most people don't have to worry about getting too little sodium. For most *healthy* Americans, too much sodium is not a problem either. Your body takes care of changes in the amount of sodium you consume. If you consume only a little, your kidneys save it. If you consume more sodium than your body needs, your kidneys eliminate it in the urine.

Is there an easy way to make sure you are eating the right amount of sodium?

People differ in the exact amount of sodium their bodies need. However, a good rule of thumb is:

Eat a wide variety of foods from the Basic Four Food Groups in moderation.

Why the Basic Four Food Groups?
Combined, the Basic Four Food Groups (Milk, Meat, Fruit-Vegetable, and Grain) can provide the balance of nutrients that your body needs for good health.

Why a variety of foods?
Foods within each group vary in the amount of nutrients (including sodium) they contain. By choosing different foods in the group, there's less chance of getting too much or too little of any one nutrient.

Why moderation?
When it comes to nutrition, it is possible to get too much of a good thing—whether it's calories or a nutrient like sodium. But by choosing moderate size servings and eating a variety of foods from the Basic Four Food Groups, you can avoid excesses.

So, remember these three guidelines for keeping your sodium intake and your total nutritional picture in balance:

- The Basic Four Food Groups
- Variety
- Moderation

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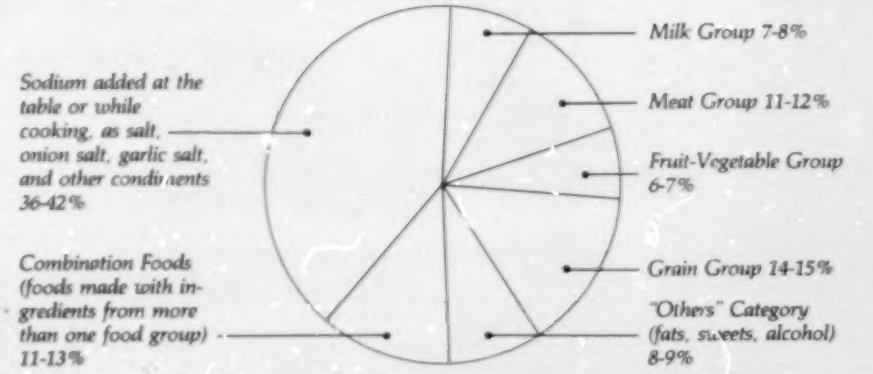
Sodium Wheel

The Food and Nutrition Board of the National Academy of Sciences recommends that you eat about 1100-3300 mg (milligrams) of sodium a day. But Americans on the average eat about 3600-5850 mg of sodium daily. Where does all that sodium come from? The chart at the right compares the amounts of sodium that come from various food items in the average American diet.


Sodium added at the table or while cooking, as salt, onion salt, garlic salt, and other condiments 36-42%
Combination Foods (foods made with ingredients from more than one food group) 11-13%
Milk Group 7-8%
Meat Group 11-12%
Fruit-Vegetable Group 6-7%
Grain Group 14-15%
"Others" Category (fats, sweets, alcohol) 8-9%

Notice that no single food group is responsible for the sodium in the American diet. So, if you're watching your sodium intake, there's no need to avoid any specific food group.

However, if you want to reduce the amount of sodium you eat, you need accurate information on the amount of sodium in your food. And that's where the Sodium Wheel comes in. While it doesn't contain every food you eat, it includes the sodium content of over 100 popular American food items. In addition, you can get more information on the sodium in your foods by:

- Obtaining a list of the amount of sodium in foods from the U.S. Government Printing Office.
- Checking food labels for the amount of sodium per serving or for ingredients with the word "salt," "soda," or "sodium." Food manufacturers often add salt or sodium to canned, frozen, and other convenience foods.
- Writing to the consumer information division of your favorite fast food restaurant for information on the sodium content of their foods.

The biggest source of sodium in your diet is the salt shaker. Almost half the salt Americans consume is added at the stove or table. You can reduce your sodium intake by as much as 1300-2500 mg just by preparing and eating your food without adding salt or other sodium-containing flavor enhancers.

The wheel shows mg of sodium in a serving. The following serving sizes were used for the foods on the Sodium Wheel:

Milk Group

Milk, yogurt	1 cup
Cheese	1 ounce
Ice cream, pudding	½ cup
Cottage cheese	½ cup

Meat Group

Meat, fish, poultry	3 ounces
Bacon	2 slices
Bologna	1 ounce
Frankfurter	1
Sausage	1 link
Peanut butter	2 tablespoons
Egg	1 large

Fruit-Vegetable Group

Cooked, juice, raw	1 cup

Grain Group

Bread	1 slice
Noodles, rice	1 cup
Cold cereal	1 cup
Saltines, graham crackers	2
Biscuits, cornbread, waffles	1
Stuffing	1 cup
Hot cereal	¾ cup

"Others" Category

Butter, margarine	1 teaspoon
Beer	12 fluid ounces
Cola, coffee	8 fluid ounces
Cake-type doughnut	1
Danish pastry	1
Wine	3½ fluid ounces
Sherbet	1 cup
Cake	1/12 of 9" cake
Pie	1/8 of 8" pie
Potato chips	10
Popcorn	1 cup
Cookie	1
Pickle	1
Olives	4

Combination Foods

Pot pie	1 (8 ounces)
Main course, soup	1 cup
Pizza	2 slices (7 ounces)
Beef dinner	1 (11 ounces)
Fast food items	1

Condiments

Salt: table, onion, garlic	1 teaspoon
Sauces: barbecue, soy, tartar, Worcestershire	1 tablespoon
Salad dressing	1 tablespoon
Mayonnaise	1 tablespoon
Horseradish	1 tablespoon
Catsup	1 tablespoon
Meat tenderizer	1 teaspoon
Bouillon	1 cube
Baking soda, baking powder	1 teaspoon
Monosodium glutamate (MSG)	1 teaspoon
Mustard	1 teaspoon
Parsley, pepper, oregano, paprika, sage, thyme	1 teaspoon

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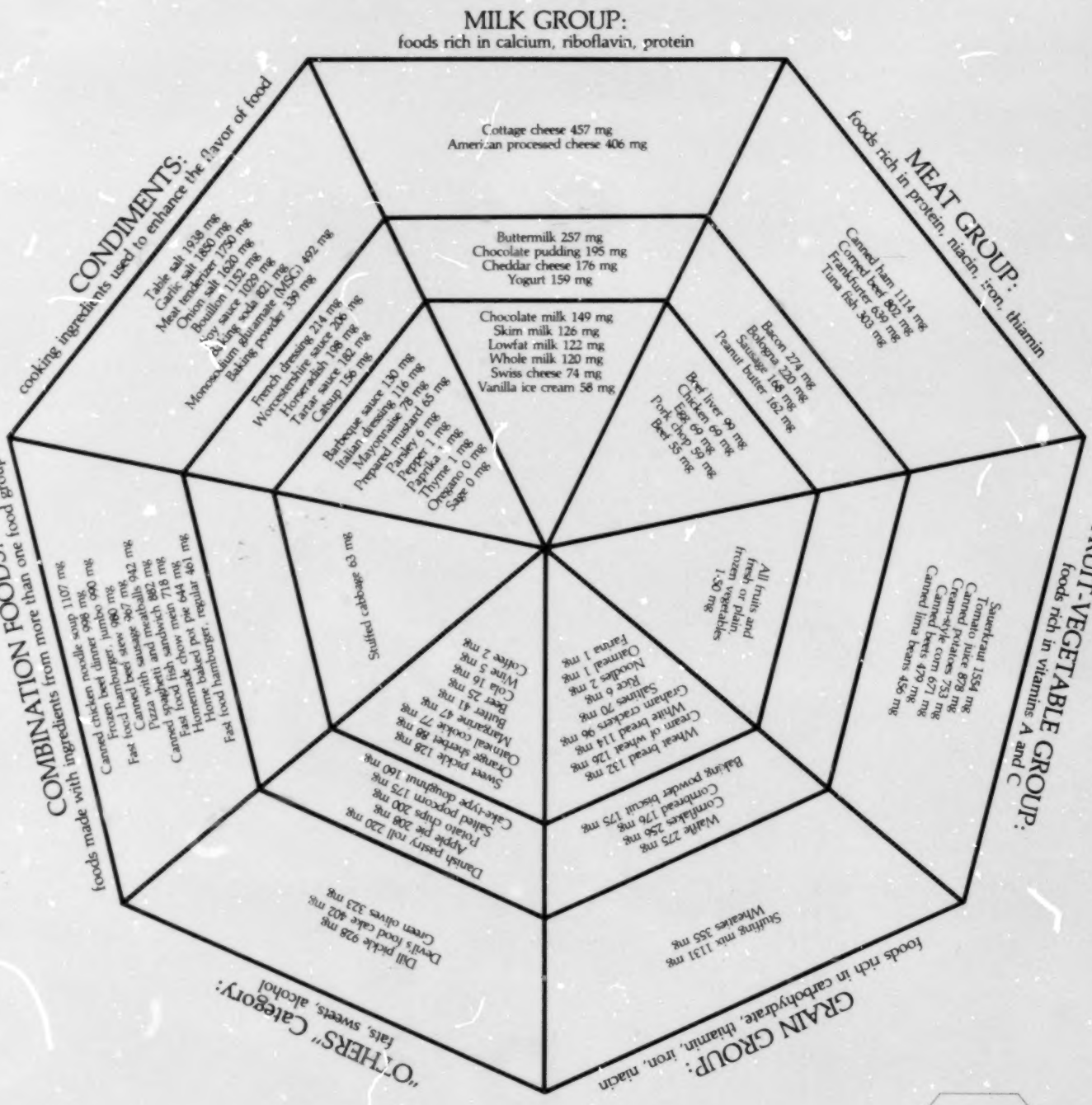
Sodium Wheel


MILK GROUP:
foods rich in calcium, riboflavin, protein
Cottage cheese 457 mg
American processed cheese 406 mg
Buttermilk 257 mg
Chocolate pudding 195 mg
Cheddar cheese 176 mg
Yogurt 159 mg
Chocolate milk 149 mg
Skim milk 126 mg
Lowfat milk 122 mg
Whole milk 120 mg
Swiss cheese 74 mg
Vanilla ice cream 58 mg
MEAT GROUP:
foods rich in protein, niacin, iron, thiamin
Canned ham 1114 mg
Corned beef 802 mg
Frankfurter 639 mg
Tuna fish 303 mg
Bacon 274 mg
Bologna 220 mg
Sausage 168 mg
Peanut butter 162 mg
Beef liver 90 mg
Chicken 69 mg
Egg 69 mg
Pork chop 59 mg
Beef 55 mg
FRUIT-VEGETABLE GROUP:
foods rich in vitamins A and C
Sauerkraut 1554 mg
Tomato juice 878 mg
Canned potatoes 753 mg
Cream-style corn 671 mg
Canned lima beans 476 mg
Canned beets 456 mg
All fruits and fresh or plain frozen vegetables 1-50 mg
GRAIN GROUP:
foods rich in carbohydrate, thiamin, iron, niacin
Stuffing mix 1131 mg
Wheaties 355 mg
Waffle 275 mg
Cornflakes 256 mg
Cornbread 176 mg
Baking powder biscuit 175 mg
Wheat bread 132 mg
Cream of wheat 128 mg
White bread 114 mg
Graham crackers 90 mg
Saltines 70 mg
Rice 6 mg
Noodles 2 mg
Oatmeal 1 mg
Farina 1 mg
"OTHERS" Category:
fats, sweets, alcohol
Danish pastry roll 220 mg
Apple pie 208 mg
Potato chips 200 mg
Salted popcorn 175 mg
Cake-type doughnut 160 mg
Sweet pickle 128 mg
Orange sherbet 88 mg
Oatmeal cookie 77 mg
Margarine 47 mg
Butter 41 mg
Beer 25 mg
Cola 16 mg
Wine 5 mg
Coffee 2 mg
Stuffed cabbage 63 mg
COMBINATION FOODS:
foods made with ingredients from more than one food group
Canned chicken noodle soup 1107 mg
Canned chicken noodle dinner 998 mg
Frozen beef dinner, jumbo 900 mg
Fast food hamburger, jumbo 980 mg
Canned beef stew 367 mg
Fast food hamburger, regular 942 mg
Pizza with sausage and meatballs 882 mg
Canned spaghetti and meatballs 718 mg
Fast food fish sandwich 644 mg
Homemade baked pot pie 461 mg
Fast food hamburger, regular 401 mg
CONDIMENTS:
cooking ingredients used to enhance the flavor of food
Table salt 1938 mg
Garlic salt 1850 mg
Meat tenderizer 1750 mg
Onion salt 1620 mg
Bouillon 1152 mg
Soy sauce 1029 mg
Baking soda 821 mg
Monosodium glutamate (MSG) 492 mg
Baking powder 339 mg
French dressing 214 mg
Worcestershire sauce 206 mg
Horseradish 198 mg
Tartar sauce 182 mg
Catsup 156 mg
Barbecue sauce 130 mg
Italian dressing 116 mg
Mayonnaise 78 mg
Prepared mustard 65 mg
Parsley 6 mg
Pepper 1 mg
Paprika 1 mg
Thyme 1 mg
Oregano 0 mg
Sage 0 mg
0-150 mg
151-300 mg
301 + mg

Numbers indicate milligrams (mg) of sodium per serving

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Your Sodium Lifestyle

Have you noticed the headlines urging people to cut down on their consumption of salt?

Have you cut down?

Should you?

Salt's been getting a lot of press lately because it's a major source of sodium in the American diet. (Salt is the common name for sodium chloride.)

Sodium is an essential nutrient. Your body needs sodium in order to function. But how much do you need?

The Food and Nutrition Board of the National Academy of Sciences recommends 1100-3300 mg (milligrams) of sodium a day as a safe and adequate amount for most Americans. However, on the average, Americans consume about 3600-5850 mg of sodium a day. And that's what the headlines are all about.

Keep in mind that these figures are only averages. Some Americans consume very little sodium. Others consume a lot. The amount of sodium you consume may actually be quite different from the average.

How do you know if you are eating the recommended amount of sodium?

Well, if you had the time and the desire, you could calculate your sodium intake by keeping track of everything you ate, checking food tables to find the amount of sodium in each food, and adding all the figures together. Then you'd have to include the milligrams of sodium you added to the foods you ate during cooking or at the table.

Or, you can take the Sodium Lifestyle Quiz. While the quiz won't give you an exact sodium intake, it will help you estimate if you are consuming more sodium than is recommended. And it will also help you identify the major sources of sodium in your diet.

Sodium Lifestyle Quiz

Directions: Read the questions. Circle the answers that describe you best. Then check the answer key to help you estimate your overall sodium intake.

1. When do you add salt to your food?
   a. Before tasting
   b. After tasting, if necessary
   c. Rarely
2. How often do you use garlic salt, onion salt, meat tenderizer, monosodium glutamate (MSG), and/or soy sauce to cook or flavor your food?
   a. Every day
   b. 2 or 3 times a week
   c. Less than once a week
3. How often do you eat canned foods, TV dinners, canned soups, bouillon, or other convenience foods (like packaged macaroni and cheese)?
   a. Every day
   b. 2 or 3 times a week
   c. Less than once a week
4. How often do you eat pickled, brined, or cured foods like sauerkraut, pickles, corned beef, ham, hot dogs, bologna, or salami?
   a. Every day
   b. 2 or 3 times a week
   c. Less than once a week
5. How often do you eat at fast food restaurants?
   a. Every day
   b. 2 or 3 times a week
   c. Less than once a week
6. How often do you eat salty snacks like chips?
   a. Every day
   b. 2 or 3 times a week
   c. Less than once a week

Answer key

How many **a's** did you circle? Three or more **a's** indicate you're probably exceeding the recommended range and getting more sodium than your body really needs. Read on to find out more about sodium in your diet.

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Sodium in your diet

1&2. *Flavor enhancing ingredients like salt contain sodium.* Use of these flavor enhancers during cooking or at the table adds 1300-2500 mg of sodium a day to the average American diet. For example:

	mg sodium
1 t Table salt	1938
1 t Garlic salt	1850
1 t Meat tenderizer	1750
1 t Onion salt	1620
1 t MSG	492
1 t Soy sauce	343

3&4. *Processed foods contain added sodium.* Salt and other ingredients with sodium are used widely in food processing. They preserve perishable items, flavor foods, cure meats (like hot dogs and sausages), ferment foods (like turning cabbage into sauerkraut), and retard the growth of mold and bacteria.

In general, the more preparation the food industry does for you, the higher the amount of sodium in the food. For example:

	mg sodium
1 cup of corn:	
Fresh	trace
Frozen	7
Canned, cream-style	671
1 Cucumber	10
1 Dill pickle	928
Lean pork (3 ounces)	59
Ham (3 ounces)	1114
Homemade beef pot pie	644
Frozen beef pot pie	1093
1 cup beef bouillon	1152
1 cup canned chicken noodle soup	1107

5. *Fast foods contain added sodium.* Fast food restaurants often add sodium to their products. But the sodium content of fast foods varies considerably from dish to dish and from chain to chain:

	mg sodium
French fries	4-128
Shakes	157-329
Burgers:	
Regular hamburger	401-520
Cheeseburger	535-1085
Specialty burger (like Whopper®, Big Mac®)	909-1848
Fish sandwiches	700-780
Chicken dinners	1915-2285
Mexican food:	
Taco	79-460
Tostada	101
Bean burrito	272

If you had a Big Mac®, fries, and a chocolate shake, you'd be consuming 1400 mg of sodium in a single meal!

6. *Low-nutrient snack foods like chips contain sodium.* Salty snack foods are usually high in calories and low in nutrients. In addition, the food industry adds sodium to these foods during processing. For example:

	mg sodium
1 ounce potato chips (about 10)	200
1 ounce corn chips (about 30)	231
1 cup caramel corn	262
1 ounce twist pretzels (about 5)	505

To sum it all up

Your body needs sodium to survive. Sodium occurs naturally in small amounts in almost all foods. So, you probably meet your body's sodium needs just by eating foods that contain sodium naturally.

But if you circled three or more **a's** in the quiz, you and the food industry are adding quite a lot of sodium to the amounts already provided by Mother Nature. As a result, you may be eating more sodium than your body needs.

To consume sodium in the 1100-3300 mg range recommended by the Food and Nutrition Board of the National Academy of Sciences there's no need to avoid any specific foods. Just think "variety" when changing your daily salt/sodium habits.

- Try using various spices (cinnamon, nutmeg, allspice, etc.) to flavor your foods instead of salt and other sodium-containing flavor enhancers.
- Make an herb shaker. Combine:

  2 t thyme
  1½ t sage
  2 t rosemary
  2½ t marjoram
  2½ t savory

  Use this combination to flavor vegetables, meats, fish, or poultry.
- Balance convenience foods and fast foods meals with home-cooked ones. For example, if you eat a fast food lunch, select a low-sodium meal made with fresh fruits, vegetables, dairy foods, meats, and grains for dinner.

And, remember moderation. Almost half the salt Americans consume is added at the stove or the table. If you need to cut down your sodium intake, start with the salt shaker. This is one area where you are in control. Remember:

- Always taste before salting.
- Take the salt shaker off the table. If you have to get up to get the salt, adding it will become a conscious (not automatic) effort.

Finally, to make sure your body gets all the nutrients—including sodium—that it needs, eat a wide variety of different foods every day from the Basic Four Food Groups:

- 2 servings of milk/dairy foods
- 2 servings of meat or meat alternates
- 4 servings of fruits and vegetables
- 4 servings of whole-grain or enriched grain products

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Worried about High Blood Pressure?

No one wants high blood pressure (hypertension). Untreated it can lead to heart attack, stroke, or kidney failure. Little wonder that people are looking for a quick-and-easy, sure-fire way to prevent this disease from occurring in the first place.

One popular idea is that you can prevent high blood pressure by eliminating salt (which contains sodium) from your diet. Unfortunately, this idea is not necessarily true.

What affects high blood pressure?

It is true that, for a small percentage of people, *high* sodium intake may lead to a rise in blood pressure. But it is not true that by avoiding salt and other food items containing sodium everybody can avoid getting high blood pressure.

Hypertension is a very complicated disease. So complicated, in fact, that scientists do not know exactly what causes it.

What scientists do know, however, is that a variety of factors influence the development of hypertension. These factors include:

- Heredity—High blood pressure tends to run in families.
- Overweight—High blood pressure often occurs in people who are overweight.
- Smoking—High blood pressure is more frequent among tobacco smokers.
- Eating habits—Your blood pressure may be affected by poor eating habits.
- Lack of exercise—High blood pressure is associated with inactivity or a sedentary lifestyle.
- Stress—High blood pressure often occurs in people who are unable to cope with stressful situations.

In other words, there is no one cause of high blood pressure. Nor is there a single cure. Each case of hypertension must be examined individually to identify the contributing factors. Each case of hypertension calls for an individualized treatment plan.

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So what can you do?

For starters, remember that high blood pressure is the silent killer. You can have it without knowing it. So, have your health status and blood pressure checked regularly by your doctor.

Second, don't treat yourself. If you have high blood pressure, your doctor will advise you of any changes you need to make in your lifestyle and/or eating habits.

Third, be aware that there is no special food or diet that can protect you from a chronic disease like hypertension. Your best bet for maintaining your health is to practice moderation.

The Food and Nutrition Board of the National Academy of Sciences suggests that 1100-3300 mg (milligrams) of sodium per day is safe and adequate for most healthy people in the United States. There's no need to go on a special diet to stay within this range. Simply eat a wide variety of foods from each of the Basic Four Food Groups:

- Milk
- Meat
- Fruit-Vegetable
- Grain

And watch the amount of salt you add in cooking and at the table.

Finally, remember, your total lifestyle affects your blood pressure.

Try to:

- Maintain a desirable weight for your height
- Exercise regularly
- Stop smoking
- Learn to relax
- Eat a wide variety of foods in moderate portions from each of the Basic Four Food Groups

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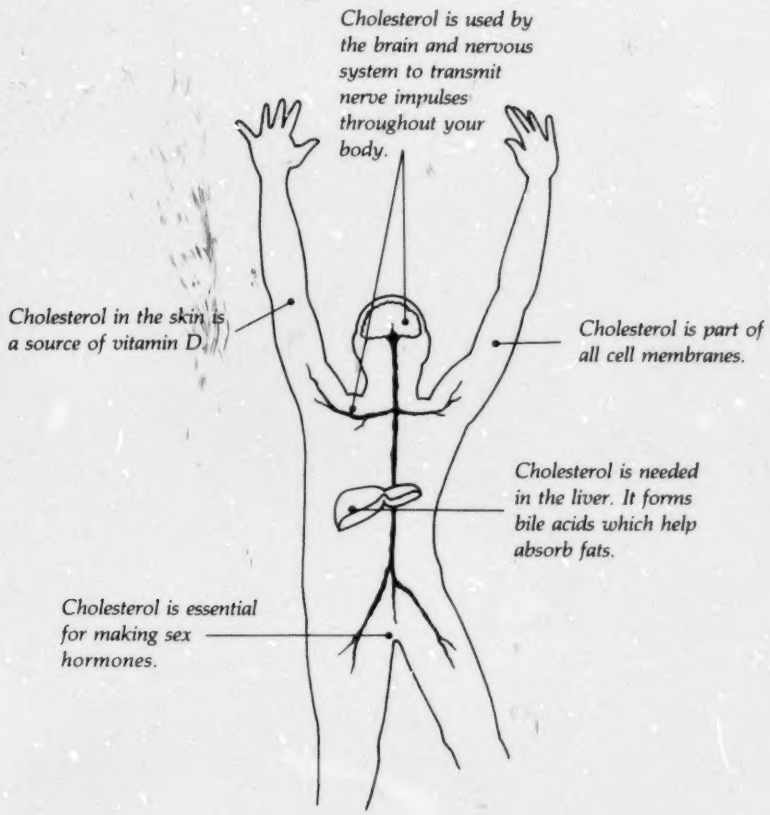
Cholesterol Facts

What is cholesterol?

- Cholesterol is a waxy substance that comes from two sources—your own body and food.
- Cholesterol is an essential part of the human body. It must be present for the body to function normally.

Your body needs cholesterol


Cholesterol is used by the brain and nervous system to transmit nerve impulses throughout your body.
Cholesterol in the skin is a source of vitamin D.
Cholesterol is part of all cell membranes.
Cholesterol is needed in the liver. It forms bile acids which help absorb fats.
Cholesterol is essential for making sex hormones.

Cholesterol is present in all body parts including:

- Brain and nervous system
- Connective tissue and body fluids
- Muscle and skin
- Blood and bone marrow
- Liver, intestines, lungs, and kidneys
- Adrenal, sex, and other glands
- Heart, spleen, blood vessels, and skeleton

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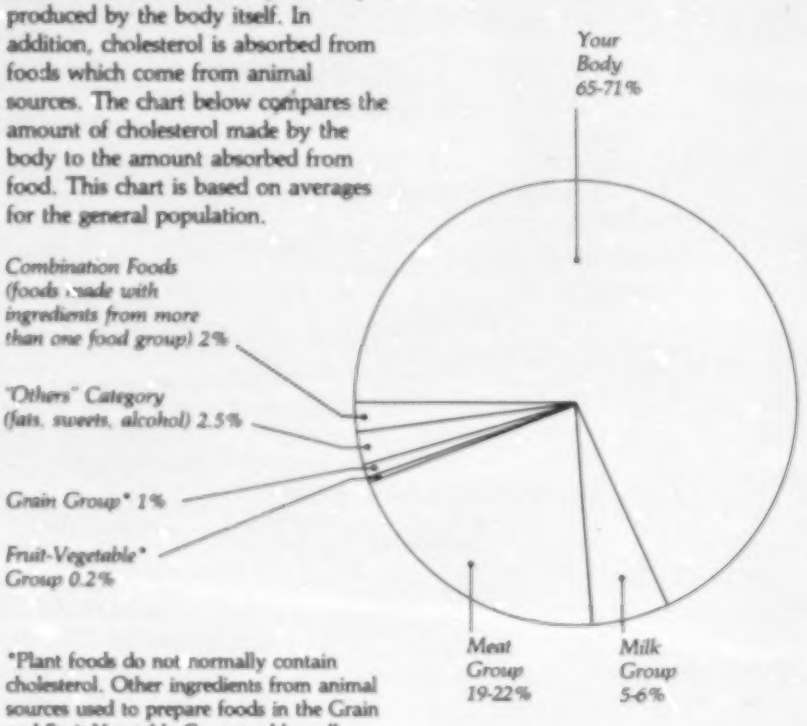
Where do you get cholesterol?

Most of the cholesterol in your body is produced by the body itself. In addition, cholesterol is absorbed from foods which come from animal sources. The chart below compares the amount of cholesterol made by the body to the amount absorbed from food. This chart is based on averages for the general population.


Your Body 65-71%
Combination Foods (foods made with ingredients from more than one food group) 2%
"Others" Category (fats, sweets, alcohol) 2.5%
Grain Group* 1%
Fruit-Vegetable* Group 0.2%
Meat Group 19-22%
Milk Group 5-6%

*Plant foods do not normally contain cholesterol. Other ingredients from animal sources used to prepare foods in the Grain and Fruit-Vegetable Groups add small amounts of cholesterol to these products.

What happens if you eat too little or too much cholesterol?

Cholesterol provides an excellent illustration of how well the human body is designed. If you consume very little cholesterol each day, the body will manufacture enough to maintain body functions.

If the amount of cholesterol you get from food increases, the body will respond by producing less cholesterol and increasing the amount of cholesterol it excretes.

People differ in the amount of cholesterol their bodies need. However, a good rule of thumb for a healthful diet is:

Eat a wide variety of foods from the Basic Four Food Groups in moderation.

Why the Basic Four Food Groups?
Combined, the Basic Four Food Groups (Milk, Meat, Fruit-Vegetable, and Grain) can provide the balance of nutrients that your body needs for good health.

Why a variety of foods?
Foods within each group vary in the amount of nutrients they contain. By choosing different foods in each group, there's less chance of getting too much or too little of any one nutrient.

Why moderation?
When it comes to nutrition, it is possible to get too much of a good thing—whether it's calories or cholesterol. But by choosing moderate size servings and eating a variety of foods from the Basic Four Food Groups, you can usually avoid excesses.

So, remember these three guidelines for keeping your cholesterol intake and your total nutritional picture in balance:

- The Basic Four Food Groups
- Variety
- Moderation

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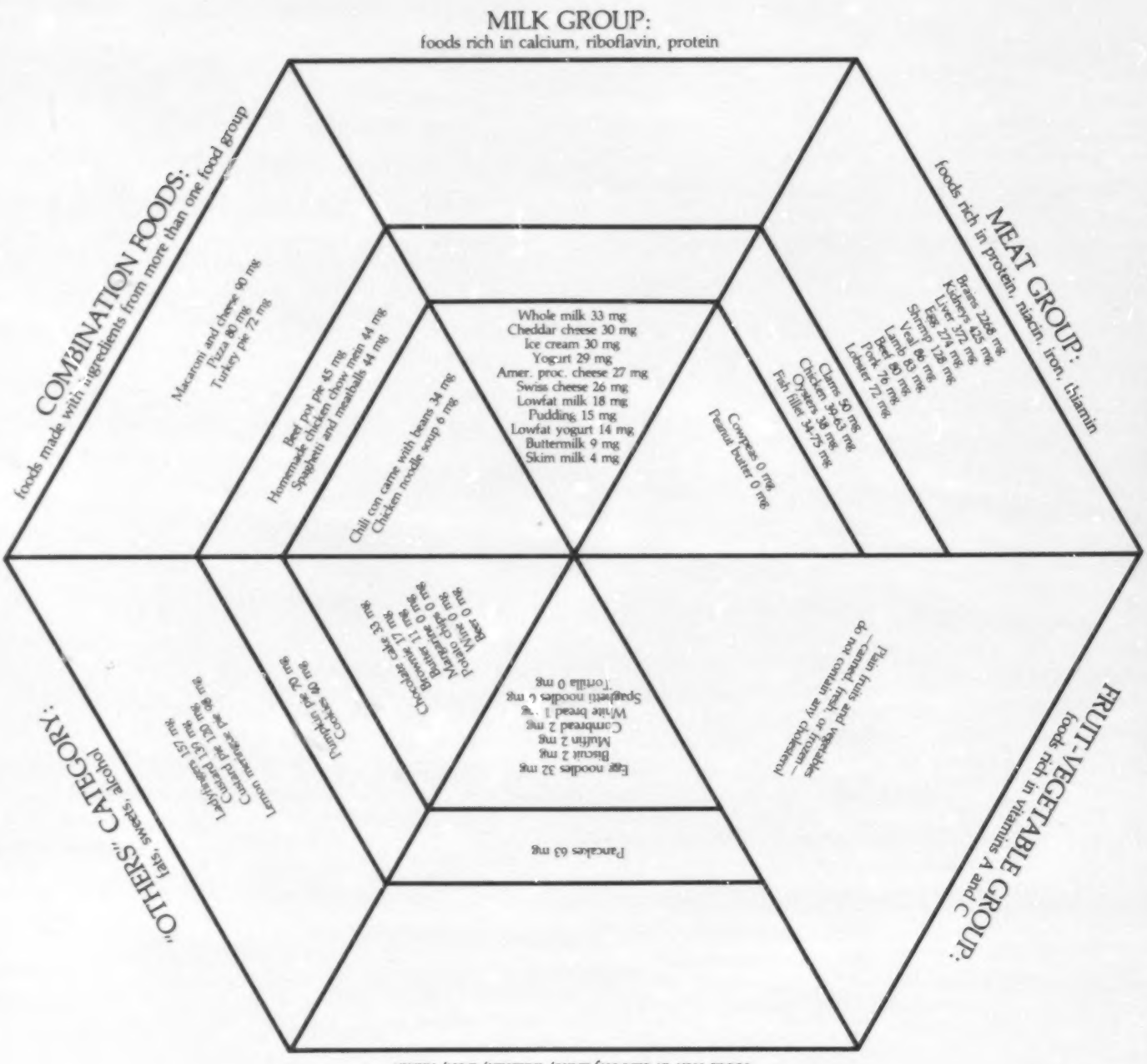
Cholesterol Wheel



Numbers indicate milligrams (mg) of cholesterol per serving.

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Cholesterol Wheel

Your body needs cholesterol

Despite what you may have heard, cholesterol is not all bad. In fact, your body needs cholesterol to function.

Cholesterol is so vital that your body produces its own supply. Your body makes about 500-1000 mg (milligrams) of cholesterol a day. That's about 2/3 of your body's total cholesterol.

The other 1/3 of your body's cholesterol comes from the food you eat. Although everyone is different, on the average, foods contribute the following amounts of cholesterol to the daily diet:

Milk Group 43-65 mg
Meat Group 172-262 mg
Fruit-Vegetable Group 2-3 mg*
Grain Group 8-12 mg*
"Others" Category—fats, sweets, alcohol 21-32 mg
Combination Foods—foods made with ingredients from more than one food group 18-27 mg

Some people worry that they may be eating too much cholesterol. These individuals may be interested to know two important facts:

- On the average, your body absorbs only half the cholesterol found in the food you eat.
- When the amount of cholesterol you get from food increases, the body will produce less of its own cholesterol and will increase the amount of cholesterol it excretes.

So when it comes to cholesterol, most people don't really have to worry. However, many people are just interested in learning where cholesterol is in the food supply. And that's where the Cholesterol Wheel comes in.

Cholesterol Wheel serving sizes

The Cholesterol Wheel lists the cholesterol content of dozens of popular foods.

The wheel shows milligrams of cholesterol in a serving. The following serving sizes were used for foods on the Cholesterol Wheel:

Milk Group

Milk, yogurt	1 cup
Cheese	1 ounce
Ice cream, pudding	½ cup

Meat Group

Meats, poultry, fish	3 ounces
Eggs	1 large
Peanut butter	2 tablespoons
Cowpeas	½ cup

Grain Group

Bread	1 slice
Noodles, spaghetti	½ cup
Muffin, biscuit, tortilla	1
Pancake	2 average

"Others" Category

Pie	1/8 of 9" pie
Cake	1/16 of 9" cake
Custard	½ cup
Butter, margarine	1 teaspoon
Ladyfingers	4
Brownie	1
Cookies	2
Potato chips	15
Beer	12 fluid ounces
Wine	3½ fluid ounces

Combination Foods

Entrees, soups	1 cup
Pizza, cheese	2 slices (7 ounces)
Pot pie	⅓ of 9" pie

*Plant foods do not normally contain cholesterol. Other ingredients from animal sources used to prepare foods in the Grain and Fruit-Vegetable Groups add small amounts of cholesterol to these products.

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Fat Facts

What is fat?

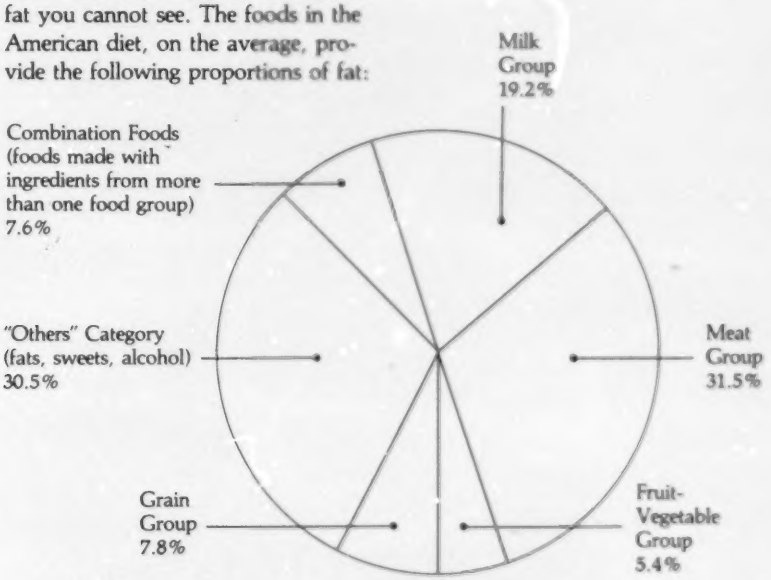
- Fat is a class of nutrients like protein, carbohydrate, minerals, vitamins, and water.
- Fat is essential for your well-being. You cannot live without it.

Why does your body need fat in the diet?

- Fat is a part of the structure of every body cell.
- Fat supplies essential fatty acids.
- Fat carries vitamins A, D, E, and K to various parts of the body.
- Fat supplies energy to the body.

Where do you get fat in the diet?

Fat is found in many foods. Some foods have visible fat. Others contain fat you cannot see. The foods in the American diet, on the average, provide the following proportions of fat:


Milk Group 19.2%
Combination Foods (foods made with ingredients from more than one food group) 7.6%
"Others" Category (fats, sweets, alcohol) 30.5%
Meat Group 31.5%
Grain Group 7.8%
Fruit-Vegetable Group 5.4%

Is all fat the same?

No. Fat in food is a combination of three types of fatty acids. Fat and fat-containing foods are classified by the fatty acid which is found in the largest amount. The three types of fatty acids are commonly known as:

- Saturated fat (including butter, other fats from animal sources, solid margarine, palm oil, and coconut oil)
- Monounsaturated fat (including olive oil and peanut oil)
- Polyunsaturated fat (including vegetable oils like corn oil, safflower oil, and soft or liquid margarine)

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How much fat do you need and which type of fat should you eat most of?

The Food and Nutrition Board of the National Academy of Sciences suggests that you get 30-35 percent of your total calories from fat. Ideally, you should consume a balance of the three kinds of fat.

Is there a problem if you eat too little or too much fat?

If you eat too little fat, you may have a problem. You may not get enough of the essential fatty acids your body needs.

If you eat too much fat, there can be another problem. One gram of fat has nine Calories, while one gram of carbohydrate or protein has only four Calories. Although eating too much of any food can result in a weight gain, it is easier to gain weight eating foods high in fat than by eating foods high in protein or carbohydrate.

This weight gain can lead to obesity. And obesity, in turn, is a risk factor for heart disease, hypertension, diabetes, and other health problems.

Is there an easy way to make sure you are eating the right amount of fat?

People differ in the exact amount of fat their bodies need. However, a good rule of thumb is:

Eat a wide variety of foods from the Basic Four Food Groups in moderation.

Why the Basic Four Food Groups?
Combined, the Basic Four Food Groups (Milk, Meat, Fruit-Vegetable and Grain) can provide the balance of nutrients that your body needs for good health.

Why a variety of foods?
Foods within each group vary in the amount of nutrients (including fat) they contain. By choosing different foods in the group, you are almost certain of getting the various nutrients you need.

Why moderation?
Moderate portions give you the nutrients you need without giving too many calories. That's important for maintaining your desirable weight for height.

So, remember these three guidelines for keeping your fat intake and your total nutritional picture in balance:

- The Basic Four Food Groups
- Variety
- Moderation

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Fat Wheel

You need fat in your diet

Despite what you might have heard, fat is not bad. In fact, the body needs fat. It is one of the essential nutrients. However, scientists recommend that people adjust the fat in their diets to a level appropriate for their caloric needs.

Fats are a highly concentrated source of calories (energy). Each gram of fat—whether from butter, margarine, vegetable oil, or meats—supplies nine Calories. Eating too much fat can add extra calories which may lead to a gain in weight.

If you're concerned about maintaining your desirable weight for height, the Fat Wheel may be very helpful. The wheel identifies foods which have visible fat (like steak and bacon) as well as those with invisible fat (like mayonnaise and roasted cashew nuts).

Cutting back on the amount of fat you eat is one way to reduce your caloric intake. The first place to eliminate fat is from foods in the "Others" category (fats, sweets, alcohol). These foods are high in fat and high in calories, but low in nutrients. They include:

- Salad dressings
- Spreads
- Desserts
- Greasy snack foods, like chips

In addition, you can reduce your intake of fat by:

- Roasting, baking, or broiling foods instead of frying
- Removing all visible fat from meats and skin from poultry before cooking
- Selecting lean cuts of meat
- Using lowfat dairy products
- Skimming off fat from gravies or sauces
- Limiting intake of deep-fat fried foods

Fat Wheel serving sizes

The wheel shows grams of fat in a serving. The following serving sizes were used for the foods on the Fat Wheel:

Milk Group

Milk, yogurt	1 cup
Cheese	1 ounce
Cottage cheese	½ cup
Ice cream, ice milk	½ cup

Meat Group

Meat, fish, poultry	3 ounces
Sausage	2 links
Nuts	½ cup
Peanut butter	2 tablespoons
Egg	1 large
Frankfurter	1
Bacon	2 slices
Dry beans and peas	1 cup

Fruit-Vegetable Group

Avocado	1
Hash browns	1 cup
French fries	10 pieces
Raw fruits and vegetables	1 cup
Cooked fruits and vegetables	½ cup

Grain Group

Waffle	7" diameter
Bread	1 slice
Bagel, muffin	1
Oatmeal, pasta, rice	½ cup
Cornflakes	1 cup

"Others" Category

Butter, margarine	1 teaspoon
Sherbet	½ cup
Sour cream	1 tablespoon
Chocolate candy	1 ounce
Doughnut, yeast, raised	1
Potato chips	15
Cake	1/9 of 9" square cake
Pie	1/7 of 9" pie
Danish pastry	4½" diameter
Salad dressing	1 tablespoon
Oil	1 tablespoon
Mayonnaise	1 tablespoon

Combination Foods

All portions are 1 cup except:

Pizza	¼ of 12" pizza
Burger King Whopper®	1

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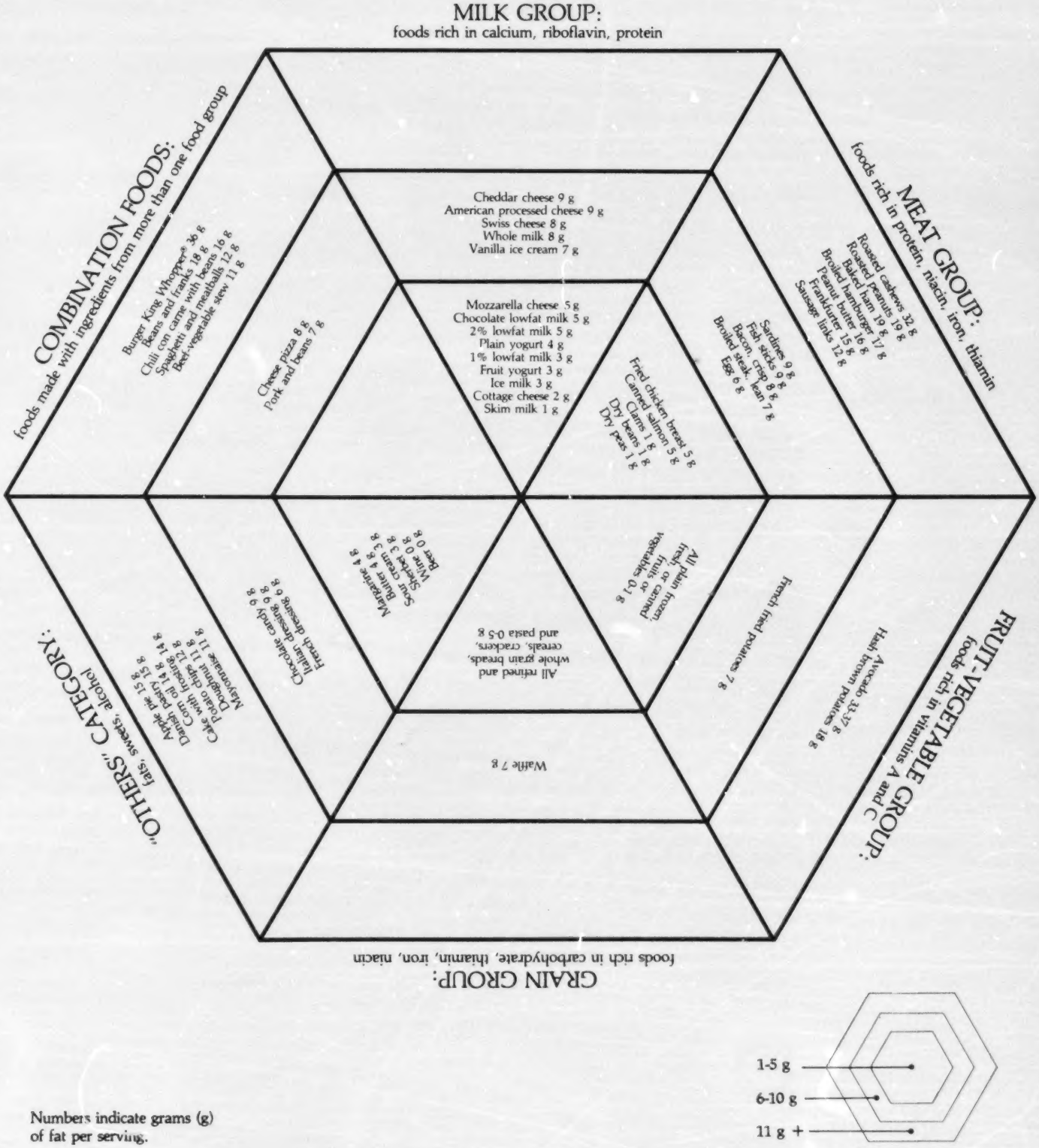
Fat Wheel


MILK GROUP:
foods rich in calcium, riboflavin, protein
Cheddar cheese 9 g
American processed cheese 9 g
Swiss cheese 8 g
Whole milk 8 g
Vanilla ice cream 7 g
Mozzarella cheese 5 g
Chocolate lowfat milk 5 g
2% lowfat milk 5 g
Plain yogurt 4 g
1% lowfat milk 3 g
Fruit yogurt 3 g
Ice milk 3 g
Cottage cheese 2 g
Skim milk 1 g
MEAT GROUP:
foods rich in protein, niacin, iron, thiamin
Roasted cashews 32 g
Roasted peanuts 19 g
Baked ham 19 g
Broiled hamburger 17 g
Peanut butter 16 g
Frankfurter 15 g
Sausage links 12 g
Sardines 9 g
Fish sticks 9 g
Bacon crisp 8 g
Broiled steak 7 g
Egg 6 g
Fried chicken breast 5 g
Canned salmon 5 g
Clams 1 g
Dry beans 1 g
Dry peas 1 g
FRUIT-VEGETABLE GROUP:
foods rich in vitamins A and C
Avocado 33.7 g
Hash brown potatoes 18 g
French fried potatoes 7 g
All plain frozen, fresh, or canned fruits or vegetables 0-1 g
GRAIN GROUP:
foods rich in carbohydrate, thiamin, iron, niacin
All refined and whole grain breads, cereals, crackers, and pasta 0-5 g
Waffle 7 g
"OTHERS": CATEGORY:
fats, sweets, alcohol
Margarine 4 g
Butter 4 g
Sour cream 3 g
Sherbet 3 g
Wine 0 g
Beer 0 g
Chocolate candy 9 g
Italian dressing 9 g
French dressing 6 g
Mayonnaise 11 g
Doughnut 11 g
Potato chips 12 g
Cake with frosting 14 g
Corn oil 14 g
Danish pastry 15 g
Apple pie 15 g
COMBINATION FOODS:
foods made with ingredients from more than one food group
Burger King Whopper® 36 g
Beans and franks 18 g
Chili con carne with beans 16 g
Spaghetti and meatballs 12 g
Beef-vegetable stew 11 g
Cheese pizza 8 g
Pork and beans 7 g
1-5 g
6-10 g
11 g +

Numbers indicate grams (g) of fat per serving.

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Are You At Risk for Heart Disease?

Even though the number of deaths due to heart disease is declining, coronary heart disease is still the number one cause of death in the U.S.

After years of research, scientists still cannot say with certainty what causes heart disease or who will have a heart attack. However, scientists have identified several *risk factors* associated with heart disease for the general population. The quiz below is designed to inform you about some of these risk factors.

What are the risk factors?

Directions: Read each question carefully. Circle the answer that describes you best. Then read the statement in the box below the question to find out what your answer tells about you and heart disease.

	Yes	No	Don't Know
1. Have either of your parents had a stroke or heart attack?	Y	N	DK

Heredity plays a key role in heart disease. If either of your parents had a stroke or heart attack at an early age, your chances of developing heart disease are greater.

2. Are you a male between the ages of 35-55?	Y	N

Although coronary heart disease is increasing in women under 55, men (particularly men between the ages of 35-55) have a greater chance of developing heart disease.

3. Do you have high blood pressure?	Y	N	DK

If you have high blood pressure, you have a much greater risk of heart disease than a person with normal blood pressure. The only way to find out if you have high blood pressure is to have it checked by a health professional.

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What are the risk factors?
(continued)

	Yes	No	Don't Know
4. Do you smoke more than a pack of cigarettes a day?	Y	N	

A person who smokes more than a pack of cigarettes a day has nearly twice the risk of heart attack as a non-smoker. The more you smoke, the higher your risk becomes.

5. Is your blood cholesterol higher than 250 mg/ 100 ml?	Y	N	DK

High blood cholesterol levels are often found in persons with heart disease. The only way to find out if you have high blood cholesterol is by having a special blood test.

6. Do you exercise less than three times a week for at least ½ hour per exercise session?	Y	N
7. Do you have a sedentary (desk) job or do you spend most of the day doing light activity?	Y	N

Regular physical activity is important in preventing heart disease. It helps you maintain your desirable weight. And, it improves blood circulation in the arteries near the heart. Inactivity, on the other hand, often leads to obesity and poor blood circulation. People who are inactive, therefore, have a greater chance of developing heart disease than people who exercise regularly.

8. Is a lot of your daily work aggravating, unsatisfying, boring, or dangerous?	Y	N
9. Do you feel you are unable to relax, even at home?	Y	N

Because stress is associated with high blood pressure, it also is a risk factor for heart disease. The stress may come from anxiety, anger, sadness, danger, or even boredom. Unless you have learned how to cope, stress may lead to problems with high blood pressure and heart disease.

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What are the risk factors?
(continued)

	Yes	No	Don't Know
10. Do you have diabetes?	Y	N	DK

Diabetes increases your risk for heart disease.

11. Find your height on the chart below. Check the suggested weight range for your height. Are you overweight for your height? Y N

*Suggested desirable weight ranges for heights**

Height (inches)**	Weight (pounds)+	
	Men	Women
58	—	92-119
60	—	96-125
62	112-141	102-131
64	118-148	108-138
66	124-156	114-146
68	132-166	122-154
70	140-174	130-163
72	148-184	138-173
74	156-194	—
76	164-204	—

**without shoes +without clothes
*Source: RDA, 1980 adapted from Bray, 1975.

12. If you answered yes to question 11, have you gained your extra weight as an adult? Y N

Overweight people are more likely to have high blood pressure and/or diabetes than persons of normal weight. Therefore, being overweight is a risk factor for heart disease. People who become overweight as adults have a greater chance of developing heart disease than those who have always been overweight.

Answer key

Heredity, sex, age, high blood pressure, smoking, high blood cholesterol, lack of exercise, stress, diabetes, and overweight are risk factors for heart disease. We do not know if these risk factors cause the disease. However, we do know that people with heart disease often have many of these risk factors.

If you answered *yes* to one or more of the questions, you may be at risk for developing heart disease. If you have not seen your physician in the past 12 months, it would be a good idea to get a complete physical soon.

If you answered *don't know* to any question, you may also want to get a checkup with your physician. What you don't know can hurt you when it comes to heart disease.

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What can you do if you're at risk?

There are a variety of things you can do to help reduce your risk for heart disease.

If you have high blood pressure...	...then follow your physician's advice for lowering your blood pressure.
If you smoke more than a pack of cigarettes a day...	...then cut down or cut out smoking altogether.
If you do not exercise regularly and have a sedentary job...	...then check with your doctor for a safe exercise program.
If you have a lot of emotional stress in your life...	...then learn how to deal with your stress.
If you have diabetes...	...then follow your doctor's advice on how to control this problem.
If you are overweight...	...then lose enough pounds so that your weight is in the desirable range for your height.

If you eat less fat and cholesterol, can you avoid heart disease?

Scientists still are trying to determine if and how the cholesterol you eat affects the level of cholesterol in your blood. Right now, they do not have a good answer.

Rather than fear the food you eat, your best defense against heart disease (and all diseases) is a good offense. Your body operates best when you are getting an adequate amount of essential nutrients. You can get the nutrients your body needs by going back to the basics:

Think balance:

Each day eat foods from each of the Basic Four Food Groups:

- Milk Group: (2 servings) — Milk, yogurt, cheese, ice cream
- Meat Group: (2 servings) — Meat, fish, poultry, dry beans and peas, peanut butter, eggs
- Fruit-Vegetable Group: (4 servings) — Fresh, frozen, or canned fruits and vegetables and their juices
- Grain Group: (4 servings) — Enriched or whole-grain breads, cereals, pasta, rice

Think variety:

By choosing different foods in each of the Basic Four Food Groups, there's less chance of getting too much or too little of any one nutrient.

Think moderation:

Make sure you get enough calories and nutrients to feel good, to look good, and to perform well. But to help maintain your desirable weight avoid portions that are larger than you need.

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Sugar Facts

Worried about eating sugar?

Are you concerned about eating foods with sugars?

With so much research showing a connection between sugar and tooth decay, many Americans are looking at the sugar content of their foods.

If you are concerned about your dental health, try this quick quiz. Learn whether you've got the facts straight on tooth decay and sugar.

Quiz

1. The more often you eat foods with sugar, the greater are your chances of developing tooth decay.	True	False
2. A teaspoon of honey is better for your teeth than a teaspoon of white sugar.	True	False
3. Sweets eaten with meals are less likely to cause cavities than sweets eaten between meals.	True	False
4. Refined sugar is the only kind of sugar that causes tooth decay.	True	False
5. Good brushing and flossing habits are important in preventing cavities.	True	False
6. Some foods may help to protect the teeth from cavities.	True	False
7. Fluoridated water prevents tooth decay only in children.	True	False

The information contained in this handout is considered by the American Dental Association to be in accord with current scientific knowledge, 1982.

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Answer key

1. True. The more often you eat foods with sugar, the greater your chances are of developing cavities. However, there are several factors involved in the process of tooth decay. Not everyone who eats a lot of sweets will develop tooth decay. And not everyone who has cavities necessarily eats too many sweets.
2. False. A teaspoon of honey is *not* better for your teeth than a teaspoon of white sugar. In fact, it may actually be worse. Foods like honey and caramel that tend to stick to the teeth are more likely to cause cavities than sweets that are cleared from the mouth quickly like ice cream.
3. True. When highly sugared foods are eaten as part of a meal, the other foods often have a "buffering" effect on the teeth. This buffering effect seems to decrease the chances of developing cavities.
4. False. All sugars—whether refined or natural can cause tooth decay. The bacteria that live in the plaque surrounding the teeth produce acid from the sugar you eat. This acid is what eventually destroys tooth enamel.
5. True. Regular brushing and flossing are an important part of maintaining good dental health. Getting regular dental checkups is important too.
6. True. Current research is investigating the role of cheddar cheese and other "friendly" cheeses in preventing tooth decay. Several studies have shown that when a small amount of certain types of cheese is eaten as part of the meal, less acid is produced in the mouth than if the cheese were not eaten. Scientists will continue studying this phenomenon to learn more about it.
7. False. Because fluoride is incorporated into the enamel as the teeth are developing, it is of special benefit to children. But adults who drink fluoridated water from birth also have greatly reduced rates of tooth decay.

If you are concerned about having a beautiful smile, remember:

- The more often you eat foods with added or natural sugars, the greater are your chances of developing tooth decay.
- Foods that contain sugars are less likely to cause tooth decay if eaten during a meal than if eaten between meals.
- Limit your snacks. If you do snack, choose foods that do not contain sugar and brush your teeth as soon as possible.
- Sticky foods are more likely to cause cavities than non-sticky foods.
- Brushing, flossing, and getting dental checkups regularly reduce the likelihood of developing cavities.
- The use of fluorides is the single most effective way of preventing tooth decay.
- Making sure your body gets the nutrients it needs for healthy teeth is another important way to keep a beautiful smile. Remember to eat a wide variety of foods daily from the Basic Four Food Groups:
  - Milk
  - Meat
  - Fruit-Vegetable
  - Grain

  Each food group supplies your body with nutrients necessary for good health and strong teeth.

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